

REMARKS

31 AMENDMENTS

32 The objection to claims 26 and 27 is traversed. A period has been added to the end of
33 each of claims 26 and 27. A separate paper showing a "marked up" version and a "clean"
34 version of each of claims 26 and 27 is attached.

35 Claim 31 has been canceled without prejudice. New claims 34 and 35 have been
36 added. Claim 31 was dependent upon claim 29 which was withdrawn by the Examiner. New
37 claims 34 and 35 are drawn to the same subject matter as old claim 31, but depend from claims
38 20 and 21, respectively, which have not been withdrawn.

39 THE INVENTION

40 The article of manufacture of this invention is comprised of a hollow capsule which
41 employs a urethane/vinyl hybrid polymer as the primary encapsulating material. A solid, water-
42 soluble chemical composition is enclosed within the hollow interior of the capsule. The
43 urethane/vinyl hybrid polymer is permeable to water and aqueous solutions, but not soluble in
44 aqueous solutions. Improved results are obtained when the urethane/vinyl hybrid polymer is
45 employed to enclose various chemical compositions, including caustic materials.

46 In another aspect, the urethane/vinyl hybrid polymer, the first material, is a supporting
47 matrix for a second material fixed in the supporting matrix.

As mentioned, the first material, the primary encapsulating material of this invention, is comprised of a urethane/vinyl hybrid polymer. The hybrid polymer can be crosslinked with polyaziridine, carbodiimides, epoxies and metal ion crosslinkers.

51 In the operation of the invention, an aqueous liquid in contact with the exterior of the
52 capsule of this invention gradually passes, by diffusion, through the first material, i.e., the
53 enclosing membrane wall, to the interior of the capsule and therein contacts and dissolves the
54 encapsulated chemical composition, i.e., the first chemical composition, to form a solution of the
55 chemical composition in water. The solution then gradually passes, by diffusion, from the
56 interior of the capsule through the membrane to the exterior of the capsule to contact the fluid
57 to be treated. The diffusion process, which consists of diffusion of the aqueous liquid into the
58 capsule and diffusion of the solution out of the capsule, requires an extended period of time to
59 be completed to thereby avoid release of all of the chemical agent over a very short span of
60 time.

It is believed that the diffusion process is driven by very small pressure differences between the interior and exterior of the capsule. Thus, when the pressure in the interior of the capsule is less than the pressure on the exterior of the capsule, the aqueous liquid passes through the membrane wall to the interior of the capsule to contact and dissolve the agent. Upon dissolution, pressure within the interior of the capsule increases to a value greater than the pressure on the exterior of the capsule. Accordingly, upon this pressure increase, the solution passes through the membrane to the exterior of the capsule. In some instances, depending upon the nature of the aqueous liquid and/or the nature of the agent, a gas may be produced within the interior of the capsule. In spite of the described pressure actuated

70 mechanism, it is believed that the pressure stresses do not cause the capsule to rupture, break,
71 dissolve or disintegrate. The capsule remains intact during the entire diffusion process.

72 The particle size of the second material fixed in the supporting matrix plays an important
73 role in the diffusion process. In this regard, it is believed that capsules which contain particles
74 having a size of less than about 1 micron, i.e., submicron particles, do not operate to dissipate
75 internal pressure, generated as described above, at a rate sufficient to prevent rupture of the
76 particle. Capsules which contain particles having a size in the range of from about 1 to about
77 15 microns fixed in the matrix, do operate to dissipate internal pressure at a rate sufficient to
78 prevent rupture of the capsule.

79 None of the references cited disclose or suggest urethane, a crosslinked urethane, a
80 urethane/vinyl hybrid polymer or a crosslinked urethane/vinyl hybrid polymer as an
81 encapsulating material for a capsule enclosing a chemical composition. There is no cited
82 reference which discloses or suggests that an aqueous material can diffuse through the primary
83 encapsulating material of this invention.

84 ART REJECTIONS

85 The rejection of claims 16, 18, 20, 21 and 23-28 under 35 USC 103(a) as being obvious
86 over Walles et al (US 4756844) in view of Vijayendran et al is traversed for the following
87 reasons.

88 Walles et al disclose capsules containing chemical agents and methods of using the
89 capsules to treat a fluid in contact with the exterior of the capsules. In this regard Walles et al
90 disclose an encapsulated bleach as a laundry detergent additive.

91 Walles et al disclose capsules containing simple salts, such as calcium chloride and
92 potassium bisulfate (Col. 3, lines 23-24), enclosed in a membrane of styrene-butadiene rubber
93 (Col. 5, line 12).

94 Walles et al contain a group of claims (1-20) specifically drawn to a composition
95 comprised of an agent and a membrane which surrounds the agent. The membrane is further
96 comprised of "submicron particles." The agent is "suitable for use in a selected environment."
97 The chemical identity of the agent is generally defined in claims 9, 10, 11 and specifically
98 defined in claim 12. Ammonium persulfate is specifically claimed in Walles et al and, because it
99 is a bleach and an oxidizing agent, it is also named in claims 10 and 11.

100 Walles et al contain a group of claims (21-24) specifically drawn to a composition
101 comprised of a fabric laundering formulation in combination with a composition comprising an
102 oxidizing agent and a membrane which surrounds the agent. The membrane is further
103 comprised of "submicron particles." The oxidizing agent is suitable to react with an aqueous
104 environment to liberate a gas.

105 Walles et al contain a claim (29) specifically drawn to a composition comprised of an
106 agent and a membrane which surrounds the agent. The agent is "suitable for use in a selected
107 environment." The claim is drawn to an improvement comprising the membrane further
108 comprising "submicron particles" which are substantially inert to the membrane and the agent.

109 It is clear that the essential novelty of Walles et al resides in the presence in the
110 membrane of "submicron particles that are substantially inert to the membrane and the agent."
111 The following passages taken from the disclosure of Walles et al are cited to place the issue of
112 the submicron particles in the context of the invention.

113 The "BACKGROUND" portion of the disclosure of Walles et al specifically cites prior
114 U.S. Patent 3,952,741 which, according to Walles et al, "illustrates a controlled release system
115 based on osmotic bursting of a water permeable wall." (Col. 1, lines 63-65) It is plain, then,
116 that Walles et al is basically an improvement on the prior art and it remains, therefor, to
117 determine the scope and content of the novelty. Walles et al state that the invention is a
118 composition and method for increasing the uniformity of release time for a given quantity of
119 agent into a selected environment. (Col. 2, lines 26-28) The problem solved was to avoid
120 "essentially sequential releases" to prevent "undesirable local high concentrations" of agent.
121 (Col. 2, lines 18-20)

122 The Walles et al invention is an encapsulated composition that allows controlled release
123 of an agent at a "narrowly predetermined time." (Col. 2, lines 58 & 59) According to the
124 invention, the release of the agent as desired is effected by diffusion of the surrounding
125 environment through the membrane encapsulating the agent until the membrane **ruptures** and
126 releases the agent. (Col. 2, lines 62-67)

127 With respect to the "submicron particles," Walles et al disclose at Col. 2, line 67 to Col.
128 3, line 4, "This membrane has a quantity of inert compound incorporated into it. The inert
129 compound, called an anti-coalescent, operates to improve the uniformity of application of the
130 membrane, which in turn improves the uniformity and predictability of the release times of a
131 given sampling of agent."

132 Walles et al state at Col. 3, lines 12-23, "In one preferred embodiment the release
133 mechanism is that of simple osmotic diffusion, in which the increased volume within the
134 membrane due to the presence of a quantity of the environment material causes **rupture** of the
135 membrane and concurrent release of the agent to the environment at large. The diffusion of
136 the environment through the permeable membrane, resulting from the osmotic attraction and/or
137 hygroscopicity of the agent, increases the volume enclosed, resulting in distension of the
138 membrane and, eventually, its **rupture** and resultant release of the agent to the environment."

139 In another aspect, by appropriate selection of agent and environment to promote a
140 reaction which releases a gas, the distension of the membrane is hastened and therefor
141 hastens the **rupture** thereof. (Col. 3, lines 26-32) Walles et al refers to this "novel mechanism"
142 as "an environment-actuated, gas-assisted **rupture** mechanism." Col. 4, Lines 35-36

143 Walles et al then closes this explanation of reaction mechanism by stating at Col. 3,
144 lines 32-37, "The presence within the membrane material of a quantity of an inert anti-
145 coalescent compound alters the timing and reliability of **burst-type** release, as compared with
146 membranes of similar composition without an anti-coalescent, as will be described below."

147 Walles et al discloses at Col. 5, Lines 44-51, "An important aspect of the present
148 invention is that there is incorporated into the membrane material an amount of at least one
149 compound that is inert to both the agent and membrane matrix material, and which comprises
150 particles having submicron diameters. Thus, the inert compound, which serves as an anti-

151 coalescent as will be described below, should be essentially a finely comminuted powder of
152 colloidal-size particles."

153 Walles et al, at Col. 6, Line 55 to Col. 7, Line 4, lists four main advantages to the
154 addition of the anti-coalescent to the membrane. One of the advantages is said to be that the
155 coating process employed improves the uniformity of the thickness of the membrane which
156 makes the time of release more precisely determinable and further narrowing the time period
157 required for complete release over a given batch.

158 Walles et al do not disclose or suggest the nature of the release mechanism if the
159 particles incorporated in the membrane are larger than submicron.

160 The teaching, inferences, disclosure and claims of Walles et al are all **limited** to
161 submicron size particles and agent release by rupture. The only connection between Walles et
162 al and Vijayendran et al is found in the disclosure of this invention. It is well established that the
163 disclosure of an invention cannot be used as a basis to reject the invention.

164 There is no disclosure and no suggestion in Walles et al to substitute the urethane/vinyl
165 hybrid polymer of this invention for the styrene-butadiene rubber used by Walles et al. There is
166 no disclosure and no suggestion in Vijayendran et al to substitute the urethane/vinyl hybrid
167 polymer of this invention for the styrene-butadiene rubber used by Walles et al.

168 There is no disclosure and no suggestion that styrene-butadiene rubber and
169 urethane/vinyl hybrid polymer are equivalents.

170 There is no disclosure and no suggestion in Walles et al or Vijayendran et al that the
171 rate of diffusion of an aqueous solution through a membrane comprised of a urethane/vinyl
172 hybrid polymer can be controlled to prevent rupture of the membrane. There is no disclosure
173 and no suggestion in Walles et al or Vijayendran et al that an aqueous solution can in fact
174 diffuse at all through a membrane comprised of a urethane/vinyl hybrid polymer. Finally, there
175 is no disclosure and no suggestion in Walles et al or Vijayendran et al that urethane/vinyl hybrid
176 polymer can in fact be used as an encapsulating material.

177 All of the essential inventive features alluded to above are found solely and only in the
178 disclosure of this invention. The Examiner's resort to the skilled artisan does not cure the
179 deficiencies of the art to suggest the invention claimed herein.

180 The Examiner asserted (at page 4, lines 3-6 of the Office Action) that Vijayendran
181 suggested the substitution of "polyurethane-vinyl polymer" in the invention of Walles "because
182 of the expectation of successfully producing controlled-release composition..." The Examiner
183 failed to cite the location of the alleged suggestion and Applicants have failed to find it.
184 However, inspection of Vijayendran clearly reveals (at column 2, lines 48-56 and column 6,
185 lines 33-36) that the polyurethane-vinyl polymer is to be applied to protect substrates, such as
186 glass, cloth, leather, paper, metal, plastic (such as polystyrene), foam, and wood. Such uses
187 suggest that the substrates are to be protected from water. The capsule membrane of this
188 invention does not protect the encapsulated chemical from water. Vijayendran et al clearly
189 teach away from the use of the material in a process which requires the diffusion of water
190 through the material to contact the encapsulated material. Vijayendran is not relevant as a
191 secondary reference and should be withdrawn.

If it's
some material
Do you want to
Inherently
protect
from water?

190 The rejection of claims 19, 22, 30 and 31 under 35 USC 103(a) as being obvious over
191 Walles et al (US 4756844) and Vijayendran et al in view of Garcia et al (US 6436540 B1) is
192 traversed for the above reasons and the following additional reasons.

193 The disclosure of Garcia adds nothing to cure the deficiencies of Walles and
194 Vijayendran as references against the claims of this invention. That Garcia may disclose a
195 cross linking agent for the polymer of Vijayendran does not by that fact render Vijayendran
196 relevant as a reference. Garcia should be withdrawn.

197 The rejection of claim 17 under 35 USC 103(a) as being obvious over Walles et al (US
198 4756844) and Vijayendran et al in view of Newlove et al (US 5948735) is traversed for the
199 above reasons and the following additional reasons.

200 The disclosure of Newlove adds nothing to cure the deficiencies of Walles and
201 Vijayendran as references against the claims of this invention. That Newlove may disclose a
202 breaker employed in the claims of this invention does not by that fact render Walles or
203 Vijayendran relevant as a references. Newlove should be withdrawn.

204 This application is in condition for allowance. Reconsideration and allowance is
205 requested.

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Respectfully submitted,

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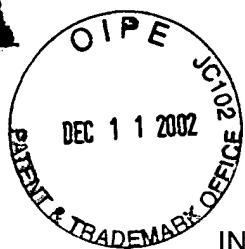
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220 Thomas R. Weaver
221 Thomas R. Weaver
222 Registration No. 25,613
223
224 December 5, 2002
225
226 Date

- 227 Marked up version claim 26
- 228 26. (As Amended) The article of claim 19 wherein said first chemical composition has a
229 particle size in the range of from about 10 to about 60 mesh US Sieve Series.
- 230 Clean version claim 26
- 231 26. (As Amended) The article of claim 19 wherein said first chemical composition has a
232 particle size in the range of from about 10 to about 60 mesh US Sieve Series.
- 233 Marked up version claim 27
- 234 27. (As Amended) The article of claim 22 wherein said first chemical composition has a
235 particle size in the range of from about 10 to about 60 mesh US Sieve Series.
- 236 Clean version claim 27
- 237 27. (As Amended) The article of claim 22 wherein said first chemical composition has a
238 particle size in the range of from about 10 to about 60 mesh US Sieve Series.



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1 IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
2

3 In re Application of:) Atty. Dkt. No. 00.05.12.1
4 Steven B. Laramay and) Art Unit: 1617
5 John H. Schneider)
6 Serial No. 09/770,931) Examiner: Gina C. Yu
7 Filing Date: January 26, 2001)
8 Title:) Duncan, Oklahoma 73534
9 HOLLOW CAPSULE HAVING A WALL)
10 PERMEABLE TO WATER OR AN)
11 AQUEOUS SOLUTION) Date: December 4, 2002

12 CITATION OF PATENT

13 The Honorable Commissioner
14 of Patents and Trademarks
15 Washington, D.C. 20231

16 Sir:

17 Applicants bring to the attention of the Examiner US Patent 6,444,316 which issued September
18 3, 2002, on application serial number 565,092 filed May 5, 2000. The patentees are Reddy,
19 Crook, Gray, Fitzgerald, Todd and Laramay. The patent is assigned on its face to Halliburton
20 Energy Services, Inc. Inventor Laramay is an applicant herein.

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